What Is Claimed Is:

1. A catalyst comprising a mixed metal oxide having the empirical formula

$$Mo_aV_bM_cNb_dX_eO_f$$

wherein

M is an element selected from the group consisting of Te and Sb;

X is an element selected from the group consisting of Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Sc, Y, La, Ti, Zr, Hf, Ta, Cr, W, Mn, Re, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, B, Ga, In, Pb, P, As, Sb, Bi, Se, F, Cl, Br, I, Pr, Nd, Sm and Tb, with the proviso that, when M is Sb, X cannot be Sb;

a, b, c, d, e and f are the relative atomic amounts of the elements Mo, V, M, Nb, X and O, respectively; and

when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1, $0 < e \leq 1.0$ and f is dependent on the oxidation state of the other elements;

said catalyst having been produced by the process comprising:

(i) admixing compounds of elements Mo, V, M, Nb and X, as needed, and a solvent comprising water to form a first admixture containing at least 2 but less than all of said elements Mo, V, M, Nb and X;

(ii) heating said first admixture at a temperature of from 25°C to 200°C for from 5 minutes to 48 hours;

(iii) then, admixing compounds of elements Mo, V, M, Nb and X, as needed, with said first admixture to form a second admixture containing elements Mo, V, M, Nb and X, in the respective relative atomic proportions a, b, c, d and e wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0 and $0 < e \leq 1.0$;

(iv) heating said second admixture at a temperature of from 50°C to 300°C for from 1 hour to several weeks, in a closed vessel under pressure;

(v) recovering insoluble material from said closed vessel to obtain a catalyst.

2. The catalyst according to claim 1, wherein said process of producing said catalyst further comprises:

(vi) calcining said recovered insoluble material.

3. A process for producing a catalyst comprising a mixed metal oxide having the empirical formula

$$Mo_aV_bM_cNb_dX_eO_f$$

wherein

M is an element selected from the group consisting of Te and Sb;

X is an element selected from the group consisting of Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Sc, Y, La, Ti, Zr, Hf, Ta, Cr, W, Mn, Re, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, B, Ga, In, Pb, P, As, Sb, Bi, Se, F, Cl, Br, I, Pr, Nd, Sm and Tb, with the proviso that, when M is Sb, X cannot be Sb;

a, b, c, d, e and f are the relative atomic amounts of the elements Mo, V, M, Nb, X and O, respectively; and

when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0, $0 < e \leq 1.0$ and f is dependent on the oxidation state of the other elements;

the process comprising:

(i) admixing compounds of elements Mo, V, M, Nb and X, as needed, and a solvent comprising water to form a first admixture containing at least 2 but less than all of said elements Mo, V, M, Nb and X;

(ii) heating said first admixture at a temperature of from 25°C to 200°C for from 5 minutes to 48 hours;

(iii) then, admixing compounds of elements Mo, V, M, Nb and X, as needed, with said first admixture to form a second admixture containing elements Mo, V, M, Nb and X, in the respective relative atomic proportions a, b, c, d, and e wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0 and $0 < e \leq 1.0$;

(iv) heating said second admixture at a temperature of from 50°C to 300°C for from 1 hour to several weeks, in a closed vessel under pressure;

(v) recovering insoluble material from said closed vessel to obtain a catalyst.

4. The process according to claim 3, further comprising:

vi) calcining said recovered insoluble material.

5. A catalyst comprising a mixed metal oxide having the empirical formula

$Mo_aV_bM_cNb_dX_eO_f$

wherein

M is an element selected from the group consisting of Te and Sb;

X is an element selected from the group consisting of Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Sc, Y, Ti, Zr, Hf, Ta, Cr, W, Mn, Re, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, B, Ga, In, Pb, P, As, Sb, Bi, Se, F, Cl, Br, I, Pr, Nd, Sm and Tb, with the proviso that, when M is Sb, X cannot be Sb;

a, b, c, d, e and f are the relative atomic amounts of the elements Mo, V, M, Nb, X and O, respectively; and

when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0, $0 < e \leq 1.0$ and f is dependent on the oxidation state of the other elements;

said mixed metal oxide having an x-ray diffraction pattern with peaks at the following diffraction angles (2θ): 22.1 ± 0.3, 26.2 ± 0.3, 27.3± 0.3, 29.9 ± 0.3, 45.2 ± 0.3, 48.6 ± 0.3, and no peaks at the diffraction angles (2θ): 28.2 ± 0.3, 36.2 ± 0.3, 50.0 ± 0.3.

6. The catalyst according to claim 5, produced by the process comprising:

(i) admixing compounds of elements Mo, V, M, Nb and X, as needed, and a solvent comprising water to form a first admixture containing at least 2 but less than all of said elements Mo, V, M, Nb and X;

(ii) heating said first admixture at a temperature of from 25°C to 200°C for from 5 minutes to 48 hours;

(iii) then, admixing compounds of elements Mo, V, M, Nb and X, as needed, with said first admixture to form a second admixture containing elements Mo, V, M, Nb and X, in the respective atomic proportions a, b, c, d and e wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0 and

$0 < e \leq 1.0$;

(iv) heating said second admixture at a temperature of from 50°C to 300°C for from 1 hour to several weeks, in a closed vessel under pressure;

(v) recovering insoluble material from said closed vessel;

(vi) calcining said recovered insoluble material;

(vii) contacting said calcined recovered insoluble material with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acid and hydrogen peroxide to form a contact mixture;

(viii) recovering insoluble material from said contact mixture to obtain a catalyst.

7. A process for producing a catalyst comprising a mixed metal oxide having the empirical formula

$$Mo_aV_bM_cNb_dX_eO_f$$

wherein

M is an element selected from the group consisting of Te and Sb;

X is an element selected from the group consisting of Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba, Sc, Y, La, Ti, Zr, Hf, Ta, Cr, W, Mn, Re, Fe, Ru, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, B, Ga, In, Pb, P, As, Sb, Bi, Se, F, Cl, Br, I, Pr, Nd, Sm and Tb, with the proviso that, when M is Sb, X cannot be Sb;

a, b, c, d, e and f are the relative atomic amounts of the elements Mo, V, M, Nb, X and O, respectively; and

when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0, $0 < e \leq 1.0$ and f is dependent on the oxidation state of the other elements;

said mixed metal oxide having an x-ray diffraction pattern with peaks at the following diffraction angles (2θ): 22.1 ± 0.3, 26.2 ± 0.3, 27.3± 0.3, 29.9 ± 0.3, 45.2 ± 0.3, 48.6 ± 0.3, and no peaks at the diffraction angles (2θ): 28.2 ± 0.3, 36.2 ± 0.3, 50.0 ± 0.3, the process comprising:

(i) admixing compounds of elements Mo, V, M, Nb and X, as needed, and a solvent comprising water to form a first admixture containing at least 2 but less than all of said elements Mo, V, M, Nb and X;

(ii) heating said first admixture at a temperature of from 25°C to 200°C for from 5 minutes to 48 hours;

(iii) then, admixing compounds of elements Mo, V, M, Nb and X, as needed, with said first admixture to form a second admixture containing elements Mo, V, M, Nb and X, in the respective relative

atomic proportions a, b, c, d and e wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0.01 to 1.0 and

$0 < e \leq 1.0$;

(iv) heating said second admixture at a temperature of from 50°C to 300°C for from 1 hour to several weeks, in a closed vessel under pressure;

(v) recovering insoluble material from said closed vessel;

(vi) calcining said recovered insoluble material;

(vii) contacting said calcined recovered insoluble material with a liquid contact member selected from the group consisting of organic acids, alcohols, inorganic acid and hydrogen peroxide to form a contact mixture;

(viii) recovering insoluble material from said contact mixture to obtain a catalyst.

8. A process for producing an unsaturated carboxylic acid which comprises subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst according to claim 1.

9. A process for producing an unsaturated carboxylic acid which comprises subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst according to claim 5.

10. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst according to claim 1.

11. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst according to claim 5.